THE JOURNAL OF SCHOOL HEALTH

Vol. XXVI DECEMBER, 1956 No. 10

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THE JOURNAL OF SCHOOL HEALTH

*Devoted to the interests and advancement of school health service and instruction.*
*Your participation by membership is solicited.*

Vol. XXVI DECEMBER, 1956 No. 10

# REPORT OF COMMITTEE ON TUBERCULOSIS AMERICAN SCHOOL HEALTH ASSOCIATION

*Presented in Atlantic City, New Jersey, on November 11, 1956*

The Committee continued with the certification of both grade and high schools on the basis of tuberculosis control work in progress. The following qualifications for certification remained unchanged:

*Class "A" Certificate*

1. Ninety-five to 100 per cent of the children must be tested at least every other year with tuberculin of adequate dosage (1.0 milligram of old tuberculin or 0.005 milligram of purified protein derivative for those not reacting to smaller doses) with the following subsequent procedures:
   a. Children of grade school age who react to tuberculin need no other phase of the examination unless symptoms or history are considered of sufficient importance. X-ray films of the chests of tuberculin reactors are always valuable, and if facilities are available, this procedure is advisable. Otherwise, x-ray films of children below the age of 12 can be omitted. However, their family physicians and the local health department should be notified in order that the source of their infection may be sought among their adult associates.
   b. All tuberculin reactors shall have x-ray film inspection of the chest during the freshman and senior years of high school, and whenever a shadow is found, complete medical examination shall be made to determine the etiology of the lesions causing it.
   c. All nonreactors to tuberculin from kindergarten through high school shall be retested at least every two years and preferably every year. Those who become reactors since the last testing shall be dealt with in the same manner as those who reacted to the first test.
2. All members of personnel of a school or system to be certified shall have the tuberculin test administered with the same dosage as for children. This includes teachers, engineers, cooks, bus drivers and all others employed by the schools.
   a. All nonreactors shall be retested every two years.
   b. All reactors on first or subsequent testing shall have x-ray film inspection of the chest. Whenever a shadow is found, the examina- shall be completed to determine whether the lesion casting it is tuberculous, and if so, whether it is of present clinical significance.
   c. All reactors, regardless of chest x-ray findings, shall be examined with reference to tuberculous lesions in other parts of the body which might be discharging tubercle bacilli.
3. All students and members of personnel who are found to have progressive tuberculosis in any part of the body that is in the contagious stage or threatening to become so in the near future, shall be removed from school until adequate treatment has been administered and the danger of contagion is remote.

*Class "B" Certificate*

Same as for Class "A" but when only 80 to 95 per cent of the children from kindergarteen through high school are tested with tuberculin.

The new certificate form (Figure 1) shows that the award is granted by the American School Health Association and the State Tuberculosis and Health Association.

1956-1957

Tuberculosis Control Award

American School Health Association

and

State Tuberculosis and Health Association

This is to certify that

Lone Tree School

has fulfilled the minimum requirements of the American School Health Association for the control of tuberculosis, in consideration for which a Class Certificate is granted.

James A. Dromley
Executive Director, State Tuberculosis Association

O. V. Barrentine
President, A. S. H. A.

Roy L. Swarm, M.D.
State Subcommittee Chairman

A. O. Dewine M.D.
Secretary, A. S. H. A.

In *Illinois*, Mr. E. J. Gross, Assistant Executive Director of the Tuberculosis Association, and in charge of the certification program, said, "Our program of certification of high schools in Illinois continues to gain momentum. Certificates have been issued to 97 schools, and this figure continues to grow from month to month." He also said, "The many varied programs in tuberculin testing hamper the issuance of more certificates, since we require all four high school grades and personnel to participate. Many county tuberculosis associations are now planning to extend their programs to all high school grades instead of selected ones, which of course is slow, but we anticipate continual growth."

Mr. Gross stated that plans were being considered for putting a gold star and ribbon on a montage of color on the certificate to make them more appealing to administrators and their students.

In June, *Contact*, the official publication of the Illinois Tuberculosis Association, carried a fine article under the title, "School Certification Program Forges Ahead in Illinois." All schools which had been certified were listed and others were urged to meet the qualifications so as to be added "to the rapidly increasing list of participants in this program."

*Iowa.* Mr. Paul Williamson, Executive Director, Iowa Tuberculosis and Health Association, prepared a narrative statement, including appraisal of tuberculin testing efforts and school certification in that state. A few of his statements follow:

"As a result of experience in Iowa, it appears that tuberculin testing, school certification and mass testing of adults establishes a better understanding of tuberculosis among the general population than any other approach.

"Our microfilm programs admittedly have their value in finding previously unknown cases, but thousands of people who have negative x-ray films do not truly understand how tuberculosis develops. They do not understand the significance of a positive tuberculin test, and if tested, a good percentage of those having negative chest films would be tuberculin reactors. In a sense these people may be lulled into a state of false security by accepting the report of a negative x-ray film without knowing if they are reactors or nonreactors.

"Testing with tuberculin has superb educational values, because a properly conducted program brings clearly to the surface what everyone should know and understand about tuberculosis.

"Certification of schools practically solves the problem of tuberculosis in schools and reaches out into the community which schools serves when proper follow-up is conducted among the families and other close associates of reactors.

"The testing of students and particularly those in the early grades is a classical approach which does not produce a high yield of cases, but a number of dramatic findings have been uncovered in Iowa attributable to the school certification program.

"The outstanding of these resulted in finding three cases among the family and relatives of two small children who were reactors in a school certification program. None of the three adult cases realized they had tuberculosis.

"As a result of school certification, school personnel and, particularly, school administrators, are exhibiting a greater interest in pre-employment physical examinations, including a tuberculin

test and/or chest x-ray film and in subsequent periodic physical examinations.

"Recent statements made by the National Academy of Science concerning the accumulative effect of radioactivity on humans and the advisability of reducing unnecessary radiation exposure of persons under 15 provide us with ample reasons to screen our children first with tuberculin and then examine the reactors promptly by x-ray and annually thereafter.

"School certification programs utilize to a high degree a team approach in tuberculosis control.

"The Iowa plan for organizing a school certification program includes the following participants in initial discussion and planning meetings:

Tuberculosis Association Executive Committee.

Field representative of the Iowa Tuberculosis and Health Association.

Case-finding coordinator of the Iowa Tuberculosis and Health Association or nurse consultant in tuberculosis of the Iowa State Department of Health, or the Director, Division of Tuberculosis Control.

Representatives of the County Medical Society.

School (School Masters' Club), school nurses, public health nurses.

Parent Teachers' Association, Welfare Department.

"Later, committees are formed, and each committee has an outline of its functions, responsibilities and relationships to other committees.

"The organizational pattern includes a General Chairman and Co-chairman of the project, together with the following committees:

1. Public Information and Health Education Committee.
2. Medical Advisory Committee.
3. Nurses' Committee.
4. Records Committee.
5. Community Aides Committee—This Committee recruits volunteers to assist at the testing center and the interpretation center.

"No one can fail to recognize that such organization for the proper conduct, follow-up and summarization of results involves many people and organizations. All of these people, including those tested, become familiar with the basically important facts about tuberculosis. They are personally involved in the program one way or another and have a learning experience through doing.

"The medical advisory committee formulates all the medical policies of the survey. Committee members with the approval of the county medical society decide what type of test will be used and who will administer and interpret the tests. (Physician interpretations are preferable in Iowa by reason of agreement between medical societies, state department of health and tuberculosis associations).

"In following this plan more physicians become actively engaged in tuberculin testing programs than in other tuberculosis association case-finding activities.

"The value of tuberculin testing is so great in the tuberculosis eradication campaign, it is the only approach at the moment which will curb the accelerated trend toward apathy and complacency of the general public.

"Our people are gauging the problem solely on the death rate and case rate, so now in Iowa we are opening vistas to indicate the total problem:

1. The reservoir of infection from whence new cases are bound to develop. (Tuberculin reactors)
2. The undiscovered active cases.
3. The unhospitalized active cases.
4. The "against medical advice" cases returning to their homes.
5. Cases not being reported prior to death certificates.
6. The relapse factor of former cases.
7. Prevalence determination.
8. The trend tuberculosis is taking in the older age group.

"Through tuberculin testing studies we are able to predict rather accurately the amount of tuberculosis we can expect to occur in Iowa during the coming years.

"Conservatively there are 269,000 people in Iowa who, if tested, would react to tuberculin. It is from this group most of our future cases will develop. It is estimated that 1885 new cases will occur in Iowa in the five years ending 1960.

"We are noticing that apathy and complacency turn to sober reflection on the part of audiences in Iowa when the facts are presented in this light.

"We believe that our school certification programs and mass tuberculin testing of adults is bringing about renewed interest on the part of the general public for the necessity of continuing our programs of education, case-finding, treatment in sanatoria and rehabilitation."

An eight-page pamphlet was issued, entitled, "A Plan for Organizing a School Certification Program," and made available to all workers in Iowa.

During the school year 1955-56, 45,337 students were tested in Iowa schools, of whom 3.04 per cent reacted. Of the 2,789 personnel members tested, 19.40 per cent reacted. Three hundred and eighty-five schools were certified.

Twenty Iowa county tuberculosis and health association budgeted funds for school certification programs to be conducted during the present school year. Some of them are already in the organization stages.

Mr. Williamson was invited to prepare a paper on tuberculin tesing in Iowa for presentation before a general session of the National Tuberculosis Association and the Trudeau Society this year. It was read in New York City on May 21. This paper was published in the *Bulletin* of the National Tuberculosis Association in September. On the evening of May 21 he read the paper which appears in this issue of the Journal.

*Minnesota.* Dr. E. A. Meyerding, Executive Secretary, Minnesota Tuberculosis Health Association, said, "We are happy to report that more and more of our counties are becoming interested in the certification program." During the school year ending in the spring of 1956, he said 306 school in 22 counties earned the American School Health Association certificate. Inasmuch as Minnesota served as the original demonstration state, it had a head start in this project. The number of certificates awarded to schools in the state now totals 2,644.

Dr. Meyerding said, "We regard the certification of schools for tuberculosis control as one of our most valuable aids in promoting tuberculosis case-finding and in educating the 'school community' to the importance of all-out participation in the tuberculin testing program . . . Offering of American School Health Association certificates has proved an effective way of appealing to school pride of both pupils and personnel. There have been instances where teachers, bus drivers, cooks and other school employees have not been convinced that the test was important for them but have participated to help their schools qualify for an award."

Again, he said, "Not too many years ago it was not uncommon to find schools in which nearly every pupil had been infected with tubercle bacilli by a tuberculous teacher, bus driver, cook or other employee. The school certification program has been of real value in securing the cooperation of faculty and school personnel and has therefore made a fine contribution toward helping to insure a tuberculosis-free school environment for our coming generations."

In *Missouri,* Dr. Walter C. Gray, Chairman of the St. Louis subcommittee of the Committee on Tuberculosis of the American School Health Association, reported that as of June 30, 1956, 100,000 school children had been tested with tuberculin, reactors had x-ray film inspection of the chest and the sources of their infections sought. In an earlier communication, he had pointed out that 13 times more cases of clinical tuberculosis had been found by seeking sources of infection in children than by any method previously employed. Dr. Gray is Chairman of the Committee of the St. Louis Academy of General Practice which is composed of 200 members. The tuberculosis work in the schools of that city has been done by this organization as a public service. A movie film in color has been produced and is in considerable demand in other states. Missouri has not yet started certifying schools.

*Montana* joined the list of states certifying schools. Mr. John H. Casebolt, Executive Director, Montana Tuberculosis Association, effected a splendid organization and produced most complete printed material, including a brochure, for every step to be taken in the certification of schools of Montana. Five physicians from various parts of the state accepted membership on the Montana subcommittee of the Committee of the American School Health Association.

In his letter of September 5, Mr. Casebolt wrote: "Since my last correspondence, the subcommittee as appointed in Montana has been actively participating in its deliberations and all forms, guides, et cetera, are now completed and are in the hands of the printers." He stated that tuberculin testing would probably begin in the schools in October, and "The school certification program should be going forward strongly by January 1st."

In *North Dakota,* James A. Swomley, Executive Director, North Dakota Tuberculosis and Health Association, and the subcommittee of physicians of the American School Health Association continued an extensive and intensive certification of schools campaign. The school certification exhibit, which Mr. Swomley built last year, was shown at the annual meeting of the National Tuberculosis Association and in a number of places in North Dakota. This is an exceedingly valuable exhibit.

In February, 1956, the *Bulletin* of the National Tuberculosis Association published an excellent article by Mr. Swomley under the title, "School Certification."

The *Christmas Seal Note,* an official publication of the North Dakota Tuberculosis and Health Association, has published items on certification of schools in practically every issue. This is widely distributed throughout the state.

In the annual printed report of the North Dakota Tuberculosis and Health Association (1955-56) is a fine article entitled, "54,000 School Children Tested for Tuberculosis." This report stated that of the 54,864 school children tested, 1,136 reacted, and of 3,735 school employees tested, 743 were positive. Positive reactors were referred to their physicians for complete examinations. During the 1954-55 school year, 11 active cases were found through the school certification program. This figure for the 1955-56 school year is not yet available. As of July 1, 1956, 970 schools had been certified in North Dakota.

In summarizing the results of the certification of schools program, Mr. Swomley said, "It is my belief that our school certification program has (1) given us a program of health education in the schools second to none, (2) given us an inexpensive case-finding method that is particularly valuable to areas of low tuberculosis incidence where other forms of case-finding may no longer be practical, and (3) improved our public relations by putting before the public a tangible program with popular appeal."

In *South Dakota,* Mr. Marvin Whaley, Executive Secretary of the State Tuberculosis and Health Association, stated that 88 schools were certified which added to the 48 certified last year, made a total of 136. In the September issue of Health-O-Gram, the official publication of the South Dakota Tuberculosis and Health Association, an article appeared under the title, "Brown County Schools Earn TB Award." Dr. R. G. Mayer, Aberdeen, Chairman of the South Dakota subcommittee stated that in Brown County every one of the 95 schools (14 city, 10 village and 71 rural schools) was tested and 72 received class A and 16 class B certificates. The seven schools which did not qualify were in rural areas with small enrollments. He said, "While case-finding is the primary object of the program, the educational value to the community is of even more importance. It serves as an excellent means of providing health education to both personnel and pupils, and all of the newspaper and radio publicity stimulated interest in the subject of tuberculosis throughout the county. Our program helped to generate favorable public opinion and hasten the adoption of a program of routine chest x-ray films of all patients admitted to St.

Luke's Hospital in Aberdeen. It helped to make physicians and the general public more aware of the importance of early diagnosis of tuberculosis."

The Committee is pleased to report that official certificates have now been issued to more than 4,000 schools in five states. The project is gathering momentum, and it is expected that a much larger number of schools will be certified during the present school year.

The Committee arranged a program pertaining largely to tuberculin testing and certification of schools which, like similar previous programs, was presented at the time of the meeting of the National Tuberculosis Association. This program was presented in New York on the evening of May 21.

Mr. Walter B. Furbush, Annual Meeting Director of the National Tuberculosis Association, kindly had our program printed in that of the National Tuberculosis Association and made arrangements for time, place and everything else necessary for our program.

Dr. Marie A. Hinrichs, Editor of the *Journal of School Health,* kindly arranged this special issue of the *Journal* for publication of these five papers and our 1956 report.

Members of Committee: Lloyd B. Dickey, M.D., San Francisco, Calif.; Herman E. Hilleboe, M.D., Albany, N. Y.; Sydney Jacobs, M.D., New Orleans, La.; H. D. Lees, M.D., Philadelphia, Pa.; Esmond R. Long, M.D., Pedlar Mills, Va.; J. B. Novak, M.D., Chicago, Ill.; Howard M. Payne, M.D., Washington, D. C.; W. P. Shepard, M.D., New York, N. Y.; David T. Smith, M.D., Durham, N. C.; John B. Towey, M.D., Powers, Mich.; James J. Waring, M.D., Denver, Colo.; J. A. Myers, M.D., Minneapolis, Minn., Chairman.

# ANOTHER FRUITFUL AVENUE OF TUBERCULOSIS CONTROL

WILLIAM P. SHEPARD, M.D.

*Second Vice-President*
*Metropolitan Life Insurance Company*

For many of us it is difficult to picture the tuberculosis control problem of only two generations ago and to compare it with today. Lest we forget our humble beginnings, let us take a quick look back to help set our future course.

When my professor of medicine, Dr. S. Marx White — a great physician and a revered teacher, still of lively memory and still possessor of remarkable wisdom in the healing art — first commenced to practice medicine, tuberculosis took the lives of nearly 200 per 100,000 population each year — a death rate nearly twenty times that of today! Tuberculosis and typhoid fever were among the commonest serious illnesses in his practice. There were very few tuberculosis sanatoria and many hospitals refused to admit tuberculosis patients except for emergency hemorrhage and terminal cases. Treatment was largely symptomatic, though a few "fanatics" in this country were advocating the "rest cure" if anyone could afford it. Chest x-rays were infrequent and, compared with present standards, difficult to interpret. Identification of the acid-fast bacillus was routine in a few laboratories but recourse to them was largely limited to a few good clinicians. Identification of tuberculous milk cows was beginning, but scrofula and tuberculous bone lesions, especially the kyphotic spine, were common. The National Tuberculosis Association was yet to be organized, hence there was no effective seal sale. Tuberculosis was the leading cause of death. It was indeed a scourge on the people. It was often considered an hereditary family taint to be hidden from friends, and then to be mentioned only as bronchitis, asthmatic attacks, weak lungs or even "the vapours."

When J. A. Myers was valiantly helping teach anatomy to me and four score other freshmen, we thought that the major obstacles between us and the practice of medicine were the appalling intricacies of the nervous system, physiological chemistry, and microscopic pathology. Little did we realize that the danger of contracting tuberculosis was an ever greater obstacle. I recall twelve cases and four deaths from tuberculosis within my own little circle of

Presented before the Tuberculosis Committee, American School Health Association, New York, N. Y. May 21, 1956.

schoolmates. The toll among our nurse colleagues was fully as great. There was no routine tuberculin testing and no purified protein derivative, but those of us who were tested in our senior year were all positive. We found comfort in Bushnell[1] who voiced the then-popular belief that the tubercle bacillus was ubiquitous, impossible to escape, and he who had survived his first encounter was fortunate for thereby he had attained a degree of immunity. This theory was fortified by Opie's[2] finding of healed tuberculosis lesions in over 90 percent of men dying in the first world war.

By then the National Tuberculosis Association was well organized with affiliations in nearly every state. They had succeeded remarkedly in obtaining legislation providing state and county sanatoria. But their program of prevention consisted of : (1) teaching early symptoms and urging prompt medical attention upon their appearances; (2) finding "pre-tuberlous" children, largely those who were underweight; and (3) providing "preventoria" or "sunshine schools" where such children were given rest, supplementary food, and judicious exposure to the sun. Our greatest defense against tuberculous disease was "a well-regulated life" which meant personal hygiene, adequate diet, and ample rest. There was still little thought of attempting to break the chain of infection from sick to well.

No one is more responsible for disseminating the chain-of-infection concept than J. A. Myers. His early studies at Lymanhurst and later among thousands of other school children convinced him and a few others that tuberculosis was contagious; that it could be controlled by preventing transmission of the tubercle bacillus from the infected human or animal to the uninfected. So commonly accepted is this demonstrable truth today that it is hard to realize how many scoffed at it only thirty years ago. It shook the foundations of the fine theories built on "phthisical diathesis" which had comforted physician and patient alike for centuries. It presented the most effective preventive measure yet conceived. It made secondary the time-honored teachings on maintaining resistance by following rather nebulous rules of personal hygiene. The development of P.P.D. and O.T. in standardized dosage added new support to the theory of preventing infection. And refinements in the taking and reading of chest x-rays became a diagnostic procedure par excellence.

Meanwhile, widespread tuberculin testing of cattle began to encourage the hope that tuberculosis might eventually be elimi-

nated in dairy herds. Dr. Myers made an extensive study of the history of bovine tuberculous control which was summarized in a series of articles in Hygeia in "Cattle's Contribution to Mankind."[3] I thought then there was a gleam in his eye which might be visualizing the day when human tuberculosis might also be controlled through mass tuberculin testing. Always twenty years ahead of his time, many have been as slow to accept his concept of focusing attention on human reactors as they were to accept the infectious disease theory. But when Dr. Myers reported to this meeting last year that nearly 3,000 schools in five states had received certificates from the American School Health Association because they had completed tuberculin tests with proper follow-up on at least 80 percent of their students and personnel, some of us began to think that perhaps Jay Myers was right again! Of that, more in a moment.

Tuberculosis control has come a long ways since the days of Dr. White's early practice and within the memory of many of us here. The death rate in this country has declined steadily since 1850, thanks in large part to steadily improving standards of living, better nutrition, and better sanitation. Modern control measures undoubtedly contributed from 1900 on. But the most spectacular decline in all history has occurred in the last decade. This is called the "anti-microbial era" by Drolet and Lowell.[4] Streptomycin was brought into general use in 1946, para-amino-salycilic-acid in 1949, and isoniazid in 1951. Other "wonder drugs" may be on the way. Since 1940 chest surgery has been a hitherto undreamed-of therapeutic device. Between 1930 and 1940 the tuberculosis death rate was declining about 3.5 percent each year. Between 1947 and 1953 it declined 64 percent or an average of 9 percent annually![5] The death rate in some states is so low that next year or the year after may produce in some states, for the first time in history, a death rate of zero. Which state will it be?

As with typhoid fever and diphtheria, some medical schools have difficulty in finding enough cases of tuberculosis for teaching purposes. As far back as 1947 Dr. H. McLeod Riggins brought a request from the American Trudeau Society to the Board of Directors of the National Tuberculosis Association for funds to subsidize the teaching of chest diseases in certain medical schools. It was supported by evidence that students were failing to learn how to diagnose human pulmonary tuberculosis.

"Hunch backs" are rarely seen compared with thirty years ago, thanks to the almost complete disappearance of the tuberculous spine. The neck scars of tuberculous adenitis, so common during my internship, are all but gone.

Sanatoria are closing or being converted to other uses, now that home treatment is at least theoretically feasible. In 1954, 95.4 percent of Navy recruits had negative tuberculin tests.[6] In congested New York City only 12 percent of fifteen-year-olds have positive skin reactions, compared with 28 percent only a few years ago. In Warsaw 84 percent of fifteen-year-olds are still positive.

There is no denying that something remarkable has happened to the age-long relationship between the tubercle bacillus and man. It calls for a re-appraisal of our control program, a new look at our changed, but none-the-less urgent problems.

The battle against the tubercle bacillus is far from won. It is more nearly won among cattle than man. Yet an expert veterinarian in the Bureau of Animal Husbandry told me recently that in his opinion, if tuberculin testing of cattle were discontinued tomorrow, we would have as many tuberculous cattle as ever within one short year! There is a lesson in this for those who would relax our vigilance now.

Rapid as has been the decline in tuberculosis mortality, especially in the last decade, there is evidence that the number of new cases has not declined in proportion. Granting the unreliability of reporting cases compared with deaths, and admitting too, the recent improvement in reporting through mass x-ray surveys and superior diagnostic procedures, nevertheless, we seem not to be controlling the spread of infection as well as we are reducing deaths. Drolet and Lowell estimate the number of active cases in the United States today to be between 350,000 and 400,000. While the number of deaths between 1947 and 1953 declined 60 percent, newly-reported cases fell only 21 percent.[7]. The newly-discovered cases are still predominantly far advanced or moderately advanced; we still fail to find the new cases in the earliest stages of their illness. There are some areas in the country where the death rate remains high and has fallen very little in the recent years.

Certainly these areas of high incidence deserve the concentrated efforts of all parts of the country in some all-out program as is now underway in New York's Harlem district. We have long since learned that the tubercle bacillus is no respecter of political boundaries or race. So long as there remains a single nidus of

tuberculous infection, our task is incomplete, our danger persists. This is no time to quibble about spending local dollars locally. The unrecognized tuberculosis in a teacher in Alabama today will be disseminated in Illinois tomorrow. The housemaid in Harlem with an open lesion will infect the children on Park Avenue as readily as her own. In the tubercle bacillus we face a common danger. It must be tracked down and stamped out wherever it may be. Its one and only source is the infected individual.

For the first time in many parts of the country, the number of infected individuals is small enough to be identified and safeguarded. For all practical purposes the tuberclin-negative individual will never infect another. Among Navy recruits in 1954, 95.4 percent were tuberculin negative. Surely we could concentrate our efforts on the 4.6 percent of this and other similar population groups. The tuberculin test enables us to identify them economically and to pinpoint our further efforts on this small number. These efforts are simple and effective in preventing further spread: (1) careful search for the source of the individual's infection; (2) careful, thorough and repeated health education of the individual to assure periodic check-up including chest x-ray and physical examination. This will do it! At long last it becomes feasible in large areas of this country where the infection rate is so low. Little did we think in the days of Eugene Opie we would ever see an infection rate so low!

The school certification program conceived so skillfully and pursued so persistently by this Committee of the American School Health Association is a long step in the right direction. It is indeed another fruitful avenue of tuberculosis control. It may not yet be practicable in areas with high infection rates, but if we are as successful as we should be in concentrating all the forces at our command on these dangerous focal points, they too may eventually adopt this final and continuing control measure. Identification and surveillance of reactors will probably be necessary indefinitely, just as tuberculin testing of cattle has been. The more experience local tuberculosis associations can gain in areas where routine tuberculin testing is practical, the more they will assure the continued stability of their program, the continued support of the public, and their ability to demonstrate successful techniques to other associations as they one-by-one attain low infection rates among their people. Mass x-ray programs may then be limited to people over a certain older age group where the infection rate may remain high and to the known positive reactors at the younger ages.

I have purposely made this identification and surveillance of reactors sound simple. In principle it is; in practice it is not. It must be done right or it had best not be attempted. Too often we see Herculean efforts made to apply skin tests to large numbers, which efforts seem to leave the local team so exhausted that nothing more is done. Before the program is even started there must be facilities available for proper reading of the skin tests, and proper and continued follow-up according to the procedures so carefully worked out by this committee. Ideally such facilities should come through joint action of the health department, medical society, tuberculosis association, and the schools, including the Parent-Teacher Association. Such joint sponsorship is not always easy to attain, but it is a community organization job in which tuberculosis association staffs are usually skilled. Simple or difficult, it is probably one of three final steps which will bring the great white plague under ultimate control: concentration of all known control measures on the remaining areas of high incidence; identification and surveillance of all reactors; and possible development of a suitable vaccine.

Concentration on areas of high incidence and surveillance of all reactors will require many years, perhaps permanent continuance of our present program. If presented properly to the public, it will fully justify continued and even increased support of the seal sale. But the story must be told the public in understandable terms, terms which will admit the progress already made, which evaluate the present situation and stress the fact that new methods are needed to deal with new conditions, terms which dramatize the fact that such new and effective methods are now possible for the first time in history, and terms which stress the importance of our most neglected field, tuberculosis research. Traditionally in this country the public responds generously to appeals for aid to the unfortunate, especially when such aid offers some promise of preventing a misfortune which might happen to them or their friends. All the seal sale needs is a new dress cut from materials depicting the "new look" at tuberculosis.

What if a suitable vaccine is developed; or a new and fully effective "wonder drug?" What will happen to local, state, and national tuberculosis associations? It is nearly ten years ago I discussed this question at the annual meeting of the National Tuberculosis Association.[8] The opinion I held then remains unchanged. In essence it is that the National Tuberculosis Association (and

its affiliates) is the best organized and the oldest national voluntary health agency of its kind in the nation. It has earned and deserved the generous support of the public because of its worthy program. It has always recognized the fact that tuberculosis control and education in general health maintenance were one and the same thing. It has had longer experience in health education than any other national voluntary group. Even after tuberculosis control is well in hand, as it soon may be, there is an enormous task still to be done in general health education in the schools and among the general public. The nation would lose an invaluable asset if the National Tuberculosis Association were dissolved, and the Association would have failed to grasp its unparalleled opportunities to help people safeguard their health. An impressive body of skill, knowledge, and techniques in health education has developed in the past three decades. These skills and techniques are the same in any field of health protection. The National Tuberculosis Association and its affiliates could become the nation's fountainhead of health education both in its development and application. Many state and local associations have changed their name to Tuberculosis and Health Associations. Is it beyond the realm of possibility that the day may come when the nation's largest and most effective voluntary agency for general health education might be called the National Health Association?

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# THE TUBERCULIN TEST — MAN'S POWERFUL WEAPON IN THE WINNING OF THE FINAL ASSAULT AGAINST THE LAST STRONGHOLDS OF TUBERCULOSIS INFECTION AND DISEASE — *

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The title of my paper may lead to certain misconceptions because I am not going to maintain that the Tuberculin Test is the supreme or the most effective weapon we have at this critical period in the war against tuberculosis.

However, it is my conviction that the tuberculin test is a powerful weapon — that the medical profession as a whole has been lax in not fully appreciating its power — that the use of the tuberculin test has been neglected in many areas, and even minimized by some health workers, particularly in past years.

I am firmly convinced that the tuberculin test is a powerful weapon which, when used to its maximum extent, particularly in certain areas of this country at the present time, can accelerate the extermination of the tubercle bacillus and rapidly end its insidious, treacherous, ruthless activities.

I entertain no illusions as to the malignant power of the tubercle bacillus. I appreciate most emphatically that it is no mean enemy and that it must be fought on all fronts by using every weapon in our possession.

I refer particularly to the vital necessity for the use and ever-increasing use of the chest x-ray by general practitioners, in the chest x-ray all admissions program in our hospitals, by the mobile x-ray units in screening programs among workers, in industry, and in the general population groups, in the chest x-ray surveys in our schools and colleges, and, of course, in all diagnostic clinics and dispensaries.

To me it is essential that the importance of the chest x-ray must continue to be emphasized and its use increased among all population groups — more particularly in communities of high tuberculosis prevalence and death rates.

It is among the populations of states with low tuberculosis prevalence and low tuberculosis death rates that the tuberculin test can achieve its greatest victories — can be a powerful weapon

*PROGRAM COMMITTEE ON TUBERCULOSIS, AMERICAN SCHOOL HEALTH ASSOCIATION held in conjunction with Annual Meeting, National Tuberculosis Association — New York City, May 21-25, 1956.

in winning the final assault against the last strongholds of tuberculosis. New Hampshire may well qualify among these states. According to all indices of progress in the control of tuberculosis, this insidious infection and its resultant disease has been brought to a low point throughout the state.

The tuberculosis deaths in 1916 totalled 502 and the death rate 114 per 100,000 population. In 1955, the tuberculosis deaths totalled 25 and the death rate, 4.6 — the lowest among the states East of the Mississippi River in 1954 (based on latest national figures). There were no deaths of anyone under 35 from any form of tuberculosis in New Hampshire in 1955.

In 1916 all of the beds in our two sanatoria were occupied with a long waiting list at both institutions. By 1935 the number of beds in both sanatoria had been doubled and there were still waiting lists. On March 31, 1956, one of our two sanatoria was closed and today there are some empty beds in the remaining institution.

In 1918 the percentage of positive reactors in one of our high schools, in the industrial city of Nashua, was approximately 62 percent. In 1956, the approximate number of positive reactors to the tuberculin test among the high school students in this same city is approximately 5 to 6 percent.

But first, let me tell you something about our state. It is one of the smallest states in area in the Union. Undoubtedly many of you think of New Hampshire as a great vacation land. We are glad to have you think of it in this way. New Hampshire has been well called the Switzerland of America. Here one may be within a few hours of broad ocean, great lakes, or a superb view of 86 mountains. New Hampshire is the northernmost of the seventeen original states. It is 178 miles long with an extreme width of 93 miles and an average width of 50 miles. Its area is 9,336 miles and its average elevation is 1200 feet. Its population is about 557,000 of which about 185,000 is rural. While New Hampshire is a great vacation land, yet it is a hive of industry as well. In fact, it ranks ninth in the United States in percentage-population employed in manufacturing, and in New England is second in that respect only to Connecticut. The principal industries are the production of textiles, shoes, paper, lumber, cigars and tobacco, hosiery and knit goods, foundry machinery and machine products, furniture, boxes and box shooks, latch dial and shoe needles, granite and monumental works.

We have a large cosmopolitan population including most racial groups. These various groups are employed for the most part in the industrial centers, especially the textile and shoe industries.

Encouraging progress is being made in improving housing conditions in our cities and some slum areas have been eliminated, yet here there is still great need for large scale improvement.

Here then is our field of action. The small area of the state and the increasing enlightened cooperation of the people has enabled the New Hampshire Tuberculosis Association, in partnership with our State Department of Health and the membership of the New Hampshire Medical Society, to wage an aggressive and intensive campaign against the tubercle bacillus, upon a statewide basis, on all fronts, with all available weapons. As rapidly as new and effective weapons have been announced they have been used.

Resources for the early diagnosis of tuberculosis have been brought to the very doorsteps of the homes of New Hampshire through the chain of chest diagnostic clinics located in 33 strategic centers in all the state's ten counties.

These chest diagnostic clinics provide consultation services for suspicious TB cases referred by physicians, state and local health departments, examination of "contacts," follow-up of "arrested" cases and examinations for TB rejectees of Selective Service, positive reactors to the tuberculin test discovered in case-finding surveys among the pupils and personnel in the schools. The Association also maintains a state-wide health education program with particular emphasis upon public participation in programs for the early discovery of tuberculosis as well as prevention of the spread of tuberculosis infection and the maintenance of good health. The Association employs a staff of nine field nurses, x-ray technician and assistant and clerical staff.

New Hampshire was among the first, if not the first, state in the nation to inaugurate a program of chest x-rays for all entrants into the armed forces in World War II. This program was initiated as a joint program by the State Department of Health and the Association. It was started with the chest x-raying of the 1700 officers and men of the 197th Regiment, New Hampshire National Guard in September of 1939.

In one year alone during World War II close to 100,000 persons were chest x-rayed in New Hampshire — about one-fifth of our population. This number includes the chest x-raying services

of our State Department of Health mobile unit, State Selective Service System, Veterans Administration, New Hampshire Tuberculosis Association's state-wide chain of chest diagnostic clinics, general hospitals and physician's offices.

However, I am here to tell you something of New Hampshire's experience and success in the use of the Tuberculin Test and the reasons that we believe it is and can be man's powerful weapon in the winning of the final assault against the last strongholds of tuberculosis infection and disease among the people of our state and nation.

New Hampshire is one of the pioneer states in the use of the Tuberculin Testing Program, inaugurating its program early in 1918 in our second largest city, Nashua. We used Koch's old tuberculin which was secured in those pioneer days from the Trudeau Laboratories at Saranac Lake. Dilutions for proper dosage were prepared in our state executive offices. We have used tuberculin, P.P.D. first and second strengths. For some years past we have used the Vollmer Tuberculin Test — the so-called patch test.

We are aware of the reported discrepancies in the reliability of the Vollmer Test and P.P.D. — some workers alleging a thirty percent variance. However, our experience would indicate that with proper precautions in the application of the patch test, it is approximately as efficient as the intradermal test and is more useful and practical for the private practitioner and for school surveys.

However, care must be taken that the patch test is left on for at least 48 hours. Failure to do so may account for some of the negative results reported as compared with the intradermal test. The latter is not subject to this interference.

Furthermore, we secure at least ninty-seven percent "consents" from parents and guardians as compared with approximately 50 to 60 percent "consents" for the needle test. However, we are not committed entirely to the patch test and could be won over to the Montoux test if we find that its use does not restrict the extent of our program.

For a considerable number of years the Association has maintained Tuberculin Test Surveys throughout the state in cooperation with the school authorities. By means of this over 20,000 pupils and school personnel have been given the tests annually. These programs have been maintained in addition to the services of the association's over-all chain of chest diagnostic clinics.

In the current school year over 30,000 tuberculin tests have been made up to the present date of students and school personnel.

In a successful effort to promote increased participation in tuberculosis case-finding by the membership of the New Hampshire Medical Society, the N.H.T.A. has for some years provided chest x-rays and tuberculin tests for the patients of private practitioners upon application to the association. More recently the Association has urged private practitioners to give the tuberculin test to all of their patients — both adults and children. The Association has offered to supply the Vollmer Tuberculin Tests, and chest x-rays for positive reactors when necessary. This offer has been accepted and more and more physicians in New Hampshire are now giving the Vollmer Tuberculin Test as a routine procedure in the examinations in their practice.

Particular effort is made to enlist teachers, janitors, food handlers and other school personnel in every one of our tuberculin test surveys. We feel that the tuberculin testing program as carried out for many years has been one of the most fruitful and successful activities of the association, a success which has been made possible by the wholehearted participation of school authorities, our physicians, parents, guardians and the children themselves.

It is with grateful appreciation that I take this opportunity to express a word of tribute to the membership of the 8 and 40 of the American Legion Auxiliary of New Hampshire who have been partners with the Association for over twenty-five years in the fight against tuberculosis in infancy and childhood. The efforts of the 8 and 40 women have encouraged and supported the ceaseless scientific endeavor of the medical profession which has done so much to change the childhood tuberculosis picture of twenty-five years ago from one of a grim and all too frequently a losing struggle to one of confident assurance of immediate assistance for early diagnosis, prompt treatment and cure.

The 8 and 40 partners have helped in many other ways. They have contributed funds for purchase of chest x-ray films, provided clerical assistance at the chest diagnostic clinics and transported children to the clinics and hospitals.

In my opinion the *tuberculin testing programs* as carried out in my state over these many years have *contributed materially to the tremendous reduction in tuberculosis morbidity and mortality among school children.*

The days when the lungs of scores of *New Hampshire's children were lacerated* and *even excavated by the ravages of the tubercle bacillus have been relegated to the past.* Rarely do we now discover children with active pulmonary tuberculosis and these are almost always associated with adults found to have "open" tuberculosis of the lungs.

Nevertheless tuberculosis has by no means been banished as an infection and disease among the children of New Hampshire.

Our tuberculin test surveys still discover a few children with active pulmonary tuberculosis, some with tuberculosis primary complex, active and many more with spontaneously arrested tuberculosis primary complex.

These children need and receive our apprehensive attention and care, for they are the potential active lung tuberculosis cases of tomorrow.

What is the power of the tuberculin test? In brief it is this:

I. *It tells who among the people harbor tubercle bacilli* and therefore have been attacked and may become possible victims. In the search for tuberculosis it is not advisable to rely always upon the chest x-ray alone.

A negative chest x-ray is no guarantee that the person has not had an attack of tuberculosis. Only the negative tuberculin test can give this certainty. It is possible for the chest x-ray to be essentially negative yet the individual may harbor tubercle bacilli — have a primary infection and a disease area so minute in degree that it is not seen upon the chest x-ray. Also, it must be remembered that in a routine posterior-anterior (PA) chest roentgenogram, at least 25 percent of the lungs is hidden from view. The loss occurs at the apics in front or back of the ribs, behind the heart and mediastinum, and below the level of the diaphragm shadow.

II. *The tuberculin test reveals among the school population the children who need treatment and observation.* It provides children with the maximum protection from the morbidity and mortality of tuberculosis.

III. The tuberculin test is *important not only for the protection of the children, but also as a lead in finding active cases — the "spreaders" among their adult contacts.* The tuberculin testing program, by leading to the discovery of these "spreaders" among their adult contacts, protects the positive reactor children from further receipt of infection and even massive doses of infection.

It it repeated or massive doses of infection with tubercle bacilli which cause tuberculosis to "run in families" and not the circumstance of heredity.

Furthermore, the discovery of these contact "spreaders" leads to their prompt treatment and the protection of the community.

IV. *The tuberculin test has a definite epidemological value* — the percentage of positive reactors is an index of the trend in the community control of tuberculosis. From my observation and experience it is my definite opinion that the tuberculin test is the best index of the prevalence of tuberculosis in any community.

We have some communities in New Hampshire in which all school children have been persistent negative reactors to the tuberculin tests. In these same communities there have been no known cases of "open" tuberculosis for some years.

A high percentage of positive reactors in a community indicates the need for intensive case finding — perhaps the use of the x-ray mobile unit upon an industrial level or a community-wide basis. In the 100 percent negative reactor communities a tuberculin testing survey once in five or six years will provide an index as to the need for further effort.

V. *The Tuberculin Test is a mighty force for the education of the people* in health protection and disease prevention. Since the beginnings of the organized crusade against tuberculosis, education has been a powerful factor for stemming the onslaught of the tubercle bacillus and forced it into retreat.

Through the tuberculin testing program untold thousands of men, women and children have been informed of this disease foe, how to detect its presence and how to combat its attack.

A tuberculin testing program which is adequately organized and carried through to a successful conclusion, quickly enlists the enlightenened support of the people and maintains their active participation in the struggle.

I have enumerated *some phases of the power of the tuberculin test*—in number *at least five.* We can testify as to its power upon all five of these phases in New Hampshire. However time does not permit testimony upon all of these five phases. In fact, discussion upon some does not appear necessary.

I will therefore discuss only point 3 which is the tuberculin *the adult contacts of positive reactor children.*
test *as a discoverer of active pulmonary tuberculosis cases among*

Our records over the years clearly indicate that the tuberculin test is a powerful aid as a lead to the discovery of tuberculosis "spreaders" — in the homes of positive reactor children.

In this respect the tuberculin testing program has been *particularly fruitful* during the *current school year 1955 to 1956.*

I will cite a few cases from the experieces of Drs. Pearl Goodman, R.T. Mulvanity, J. D. Spring and W. D. Thibodeau of Nashua; Dr. Douglas W. Walker of Laconia, and myself in Manchester.

In Nashua in a family of six, three children had a positive reaction to the tuberculin test. The N.H.T.A. field nurse talked with the father and mother—apparently there was no history of TB in the family. All were advised to have an x-ray of the chest. The father was found to have pulmonary TB, positive sputum. He was admitted to a sanatorium.

Another family of five, three children — 2 had positive reactions to the tuberculin test. The family was advised to have x-rays. The father admitted that he had a cough for years. On x-ray he was found to have active pulmonary tuberculosis. He was admitted to a sanatorium. One child eight years of age was ill and found to have a TB meningitis.

Another family of three—one child positive test.

X-ray of child—TB primary complex, arrested.

X-ray of father—TB primary complex, arrested.

X-ray of mother—Negative.

N.H.T.A. field nurse was told — "No TB in family." Upon checking with the grandparents, the nurse discovered that the grandfather, 67 years of age, a retired railroad man, had a cough and had been raising sputum for several months. His chest x-ray presented signs indicating pulmonary tuberculosis, active. The sputum examination was positive. Patient died at the sanatorium several months after admission of chronic pulmonary TB and cardiac disease.

In the service of Dr. Douglas W. Walker over the past few years we find the following cases discovered as a result of the tuberculin testing program.

*Family of W.D.*:

Son 11 years old positive reactor—all members of family chest x-rayed. Father's chest x-ray presented findings indicating pulmonary tuberculosis, active. He was admitted to a sanatorium—thorocoplasty was done—good recovery.

*Family of Mr. W.*:

Four children were positive reactors. They were referred by Dr. Walker to the N.H.T.A. clinic.

X-ray of Mrs. W.—negative.

X-ray of Mr. W.—pulmonary tuberculosis, active—no symptoms—admitted to a sanatorium. One child later developed TB meningitis.

*Family of D. C.*:

A teacher presented a positive tuberculin test. All family chest x-rayed. Mr. D. C., husband of the teacher, presented x-ray findings of Pulmonary TB, active. He was admitted to a sanatorium—had chest surgery—good recovery.

*Family of Mr. K.*: (recent arrivals in N. H.)

Two stepsons found to be positive reactors.

All family chest x-rayed—x-ray of the two stepsons TB primary complex, arrested. One stepson showed pulmonary tuberculosis by x-ray—admitted to Laconia Hospital and then transferred to North Reading (Mass.) sanatorium.

Mr. K.—x-ray showed pulmonary TB, moderately advanced, active. Admitted to Massachusetts State Sanatorium at Rutland.

*Family of Mrs. B.*:

In the current tuberculin testing program a 12 year old girl student presents a positive reaction. Check-up of the family results in discovery that the mother, age 30, has an active pulmonary tuberculosis. The case is found within the past four weeks. The 12 year old daughter's chest x-ray shows definite calcification of the tracheobronchial glands. A nine year old son is a negative reactor. His chest x-ray is negative.

A five-year old son is a positive reactor—his chest x-ray shows calcification of the tracheobronchial glands.

A four year old daughter is a positive reactor—her chest x-ray is negative. The husband is a positive reactor and his chest x-ray is negative.

The tuberculin testing program of 1955 to 1956 in the public and parochial schools of the city of Manchester is of particular interest. Manchester is the largest population center in our state —approximately 83,000. The current year's program is not as yet completed with reference to the tuberculin testing of the school population, the chest x-raying of the positive reactors or the checking by chest x-rays of the contacts in the homes of the positive reactors.

However, of the work accomplished to date, the following data is of interest. The percentage of positive reactors among the students in the public and parochial high schools is approximately the same — between 5 to 6 percent and in the grade schools, both public and parochial, about 2 to 3 percent. As rapidly as possible all positive reactors have been chest x-rayed as well as all adult contacts in the homes and the school employees.

Particularly impressive in the current year's program in Manchester has been the discovery of active pulmonary tuberculosis cases among the adult contacts of positive reactor children. I cite the following cases:

*Mrs. H.*—widow—age 45—employed as a clerk.

Son—age 13—found to be a positive reactor. His chest x-ray showed findings indicating TB pulmonary complex, arrested.

Another son (twin) age 13—also a positive reactor. His chest x-ray negative. The chest x-ray of Mrs. H. showed findings indicating tuberculosis infiltration in the left upper lobe—active stage of the disease. Mrs. H. was admitted to the N. H. State Sanatorium. She is making good progress towards recovery.

*Case of Mrs. S.*:

Son—age 13—positive reactor. His chest x-ray presented findings indicating thickening and calcification of the tracheobronchial glands.

Another son—age 12—tuberculin test negative—chest x-ray negative. A third son is in the U. S. Navy.

Mrs. S.—chest x-ray presented findings indicating active pulmonary tuberculosis. She was admitted to the N. H. State Sanatorium.

Mrs. S.—chest x-ray negative.

*Case of Mr. and Mrs. Z.*:

Son—age 10—positive reactor. His chest x-ray showed signs indicating TB, primary complex, arrested.

Mr. Z—chest x-ray presented findings indicating fibro-calcific tuberculosis right upper lobe.

Mrs. Z.—chest x-ray presented findings indicating fibro-calcific tuberculosis at base of the right upper lobe.

Both mother and father and son are being chest x-rayed every three months.

*Case of Mr. J. S.*:

A WW II veteran—age 51—a bachelor—uncle to a 12 year old boy found to be a positive reactor.

Mr. J. S. was chest x-rayed along with other family contacts of the boy. Chest x-ray of Mr. J. S. presented an area of increased density in the right upper lobe—about the size of half a dollar—with a small area in it suggestive of beginning cavity formation. Mr. J. S. maintained he was in good health, no symptoms, work steadily in a shoe factory. He was persuaded to enter the VA Hospital in Manchester for study of his case—gastric washing showed presence of tubercle bacilli. Mr. J. S. was transferred to the VA TB Hospital at Rutland, Mass.

Among the 8,222 school children already given the tuberculin test in the 1955-1956 program in the Manchester schools and the positive reactors chest x-rayed, a total of 31 have been found to show TB primary complex, arrested and 58 found to show calcification of the tracheobronchial glands.

I would like to mention also the experience of one of our pediatricians in our Capital City of Concord. A mother brought to him for examination her six year old son. The patch tuberculin test was applied as a routine procedure and reaction was positive. The chest x-ray was negative. The mother's chest x-ray was negative. The father's chest x-ray presented findings indicating tuberculosis involving both lungs. His sputum examination disclosed the presence of tubercle bacilli. The patient was admitted to a sanatorium where he made a good recovery.

In my forty-five years of experience as a clinician and worker in the tuberculosis field among the people in New Hampshire, *I have witnessed not infrequently the long thread of circumstance which leads from tuberculosis primary complex to the evolution of active tuberculosis disease of the lungs or reinfection type tuberculosis.*

*This long thread of circumstance has been graphically portrayed for us* on many occasions *by the great pioneer leader in this work, Dr. J. Arthur Myers of Minneapolis, Minnesota.* It is my considered belief that *endogenous infection with subsequent breakdown of* some of these cases of primary infection is the *controlling factor in producing reinfection type pulmonary tuberculosis.*

Our immediate objective in the war against human tuberculosis is, in my opinion, the consummation of a program for the

tuberculin testing of the entire national population, with subsequent chest x-rays of all positive reactors and the carrying out of adequate follow-up for prevention and treatment.

This is indeed a consummation greatly to be desired but not so easily achieved.

Dr. James E. Perkins, Managing Director of the National Tuberculosis Association in a recent N.T.A. Bulletin states as follows: "In the United States our principal problem from here on is that of dealing with the person who reacts to the tuberculin test — evidence is pretty overwhelming that the great majority of new active cases of tuberculosis occur among those who have been reactors to tuberculin for some time and represent a breakdown into active disease of a smoldering infection of virulent tubercle bacilli — the best statistical estimate as to the prevalence of tuberculin reactors in the United States is about one-third of our population, roughly 50 million people, are reactors. In other words, about 50 million people harbor virulent human tubercle bacilli which probably will produce active disease at the rate of probably well over 100 new active cases per 100,000 reactors per year."

In New Hampshire I estimate that approximately 15 percent or approximately 85,000 of our people harbor living tubercle bacilli. Despite our rapid reductions in the tuberculosis death rate we have just "scotched" the tubercle bacillus — we are far from its extermination. The job ahead staggers the imagination. It will require all available resources of official and non-official health agencies and even more, of course, the continued intelligent wholehearted cooperation of our people.

We can win our goal by extensive and intensive use of the tuberculin test in the infant welfare clinics, in the pre-school clinics, in the schools, in the colleges, in the physician's private practices, in the general hospitals, in all institutions, in the programs of official and voluntary health agencies and among the population — in all age groups.

We have raised our sights in the war against human tuberculosis in New Hampshire, from not only the annual reduction of the numbers of the afflicted and disabled and those slain in conflict, but to the destruction of its cause — the destruction of the tubercle bacillus — with the extermination of all of its treacherous potentialities for disaster to the lives, happiness and welfare of our people.

We press onward with the confident assurance and in the firm determination that the day will come when throughout our land among the men, women, and children in its communities, towns, and cities, there will be one-hundred percent negative reactors to the tuberculin test and that we can rejoice in the extermination of the tubercle bacillus, man's ancient, insidious, stealthy, cruel and ruthless disease foe.

* * * * *

## MEDICAL AND PUBLIC HEALTH ADVANCES IN TUBERCULOSIS

Credit for the strides made in preventing deaths from tuberculosis should go to medical advances, improved and stepped-up case finding and other public health measures, better living and working conditions.

Outstanding among the medical advances are the availability of drugs effective in treating tuberculosis and refinements in surgery.

But before treatment can begin, the disease must be diagnosed. And health authorities believe there are at least 150,000 people in this country suffering from tuberculosis whose disease has never been reported and who may not be under medical care.

With drugs, the period of infectiousness may be relatively brief. As a result, the stay in the hospital has been shortened for many patients. But even after leaving the hospital the patient must continue treatment at home. Unless the utmost precaution is taken, there is always danger that the disease will flare up and the individual will become infectious again. The whole vicious circle is started again and the disease continues to be spread.

More and more people are living today with tuberculosis that has been converted from active to inactive — approximately 800,000 at present. This number can be expected to increase. Until permanency of cure can be assured, this high prevalence of inactive TB is a constant if quiet threat to control of the disease.

* * * * *

## HIGH COST OF TB

Satisfaction over the saving of lives of tuberculosis patients is tempered by the realization that even today 1,200,000 Americans require medical care or supervision for active or inactive tuberculosis, that another 50,000,000 or more are unwilling hosts to live tubercle bacilli, that tuberculosis is costing this country $600,000,000 a year, largely in tax dollars.

# PROGRESS IN SCHOOL CERTIFICATION

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The Mantoux tuberculin test has been used in Minnesota schools for well over thirty years. The first testing survey was conducted back in 1924 by Dr. S. A. Slater of Southwestern Minnesota Sanatorium in Worthington, Minnesota. However, it was not until 1930 that routine school surveys were begun. They have been conducted regularly in an ever increasing number of schools throughout the state, sponsored either by the various sanatoria or by the Minnesota Tuberculosis and Health Association, and usually financed by the Christmas Seal fund.

In the Riverside Sanatorium district, comprising four counties in the west central part of Minnesota, we started testing surveys in our schools in 1930 with a definite long range plan in mind. At that time, the patients in this sanatorium, like in most of such institutions, were predominantly young people, teen agers, or young adults. The familiar history of contact in infancy or childhood with a parent or near relative suffering from contagious pulmonary tuberculosis was given by most of the patients. Few were diagnosed in early stages of the disease.

The main goal of our early school testing surveys was to discover those children in our schools who had been so infected with tubercle bacilli, in hope, first, of finding the source of infection and removing it, and secondly by checking the infected child regularly to avoid the development of active tuberculosis disease or at least discover it early enough for effective treatment to be instituted.

We soon discovered that these testing surveys, in order to be effective, would have to be conducted at regular and fairly short intervals. Also, that we would have to reach as close to one hundred per cent of the school enrollment as humanly possible. I would like to mention two of the many cases which emphasized these needs.

**Case one, E. F.* E. F. was a young boy who transferred to a small Minnesota high school, from a rural school when he reached the seventh grade. Tuberculin testing surveys were conducted in this school twice during the years E. F. was in high school. However, he refused to be tested. Toward the end of his senior year he developed what was at the time diagnosed as "influ-

*See The Menace of the Tuberculous Teacher — Minnesota Medicine, September, 1933, L. S. Jordan, M.D. and K. B. Jordan, M.D.
See The Teacher (Lewis S. Jordan, M.D.), Journal Lancet, April, 1936.

enza." During the summer months, after his graduation, a diagnosis of pulmonary tuberculosis was made and he entered a santorium for treatment that fall. At that time the lesiion was bilateral, with a cavity in right apex and the sputum was positive. We tested the students in that school that same fall. The previous surveys had shown 7.3% and 7.9% reactors respectively. This survey gave us the following: Those students who had been juniors when E. F. was a senior showed 81.8% reactors. Those who had been sophomores 71.4%. The freshmen 55.5%. In grades from seventh down pupils had had little contact with E. F., and only 6% showed positive reactions.

Another such case was that of H. G. who also attended a small high school. He was given a Mantoux test during a school survey when he was in the seventh grade. He was found to be one of the few reactors. The percentage at that time was 4.7%. Unfortunately for himself and his school mates, H. G.'s mother refused to allow him to be x-rayed. The school was not in a sanatorium district, there was no school or county nurse to follow-up the case, consequently, no further check was made. Two years later, just before another testing survey was to be conducted in the school, H. G. was found to have far advanced pulmonary tuberculosis with positive sputum, having hemmorrhaged on the basketball floor.

The testing survey which followed gave these findings: 93.3% reactors in the freshman class (this was H. G.'s class) and 85% reactors among the rest of the high school students. The lower grades gave only 4.5% reactors. All the pre-school children living near H. G. (who was a very friendly young lad) were reactors to tuberculin. This occurred in 1939. Since then, the sixty-seven classmates infected have scattered, but seven known cases of tuberculosis have developed among them with three deaths.

Testing surveys gave us many such cases. We have not the space to report them, but they made it evident in order to maintain a safe school environment, we would have to test as near one hundred percent of the pupils as possible, at regular and short intervals of time.

*Another source of infection showed up early in our testing surveys. This was the danger of tuberculous teachers or school employees. In the largest high school in the Riverside Sanatorium district a music teacher was found with far advanced tuberculosis. 33.3% of the band members were found to be reactors, compared to 13.2% for the rest of the high school. Everyone of this teacher's private pupils were reactors. Two of these pupils showed x-ray findings, necessitating reduced activity and close watching for many years. During the same two-year period we found seventeen school employees with active and contagious tuberculosis.

In an elementary parochial school we found that 42.6% of the seventh and eighth grade pupils were reactors, whereas the rest of the grades showed only 11.2%. The Sister teaching the seventh and eighth grades was found to have moderately advanced

*School Accreditations in Riverside Sanatorium District — May 18, 1954 — Report of the meeting of the committee on tuberculosis of the American School Health Association at Atlantic City — May 18, 1954.

pulmonary tuberculosis. The case was unsuspected until the testing survey revealed these results. We have similar findings showing the danger of the infective school bus drivers, cooks, office girls, and other school employees. Obviously, maintaining a safe school environment demands checking all teachers and employees.

In 1943 these results of school testing surveys and others like it were studied by a Minnesota sub-committee appointed by the committee on tuberculosis of the National School Health Association. Members of this committee were Dr. E. A. Myers, Minneapolis, Minnesota; Dr. E. A. Meyerding, St. Paul, Minnesota; Dr. S. A. Slater, Worthington, Minnesota, and Dr. L. S. Jordan, Granite Falls, Minnesota.

*This committee prepared standards of tuberculosis control in schools. Schools meeting these standards would be accredited, and would be awarded certificates.

*For a Class A Certificate*:

1. 95% or more of the students are to receive the tuberculin test. All reactors are to be x-rayed yearly.
2. 100% of the personnel of the school (teachers, janitors, school bus drivers, cooks, etc.) are to be tested and reactors x-rayed yearly.
3. More complete examination of all reactors showing x-ray findings is of course mandatory.
4. Some form of educational program for the staff of the school so that the fundamentals of tuberculosis control are understood.
5. Non-reactors to be retested each two years.

*For a Class B Certificate*:

This certificate is given as an encouragement to those being unable to reach the A standards. The requirements are the same except that only 80% of the pupils are tested and 100% of the personnel.

We add a gold star to an A certificate if 100% of the pupils are tested.

Since the system of accreditation of schools was adopted, we have offered the test every two years to the entire enrollment of all the schools (rural and urban, public and parochial) in the four counties comprising the Riverside Sanatorium district.

The accompanying chart shows what excellent cooperation we have received from the parents and the school personnel.

Since our first testing surveys, the percent of reactors in our schools has dropped from an overall of 13.9% to a present percentage of 3.8%. Some of our schools in our early testing showed as high as 30.5%. In our last survey, 1955-1956, no school showed more than 5%. There has not been any significant change in the overall percentage of reactors in the last ten years.

*See article in Journal Lancet, April, 1942, "Tuberculosis Occurring in High Schools." Kathleen Jordan, M.D.

## SUMMARY

Mantoux Testing Survey in Schools of the Riverside Sanatorium District (1946-1956):

| SCHOOL YEAR | Number of Schools in District | Total Enrollment of these Schools | Number Tested | % Tested | Number of School Personnel Tested | Number A Certificates Awarded | Number B Certificates Awarded |
|---|---|---|---|---|---|---|---|
| 1946 | 277 | 13255 | 11.814 | 89.1% | 818 | 161 | 64 |
| 1948 | 257 | 13783 | 12.715 | 92.2% | 760 | 170 | 40 |
| 1950 | 33 | 10976 | 10.469 | 95.4% | 682 | 22 | 7 |
| Urban School Only | | | | | | | |
| 1952 | 222 | 14700 | 13.915 | 94.6% | 744 | 125 | 31 |
| 1954 | 172 | 14507 | 13.877 | 95.6% | 910 | 133 | 16 |
| 1956 | 158 | 15931 | 15.291 | 95.9% | 1011 | 89 | 24 |

This summary to be referred to during the reading of: "Progress in School Accreditation."

By Kathleen B. Jordan, M.D.

However, over the period of twenty-six years we have noticed a definite decrease in the size of the reactions found among the school children. In the early days of our testing programs, violent reactions with vesiculation, lymphangitis and lymphadenitis (red streak up the arm and enlargement of the axillary glands) were not uncommon. Today we rarely see what we called in those days a "four plus" reaction. However, we still see them when we test adults over forty years of age.

An infected child, evidenced by a reaction to tuberculin, points to a contagious source of infection. The most important part of these surveys, and the most difficult, is to find that source of infection. We do not always find it, but the years of testing have revealed to us some most interesting infective sources.

In our rural area, relatives, hired help on the farm, and especially transient labor, should be checked. Where in the early testing we often found the parent to be the infective factor, we now are more likely to find it to be a grandparent. During those same years the average age of the patients in Riverside Sanatorium has gone up from twenty-five to sixty-five years.

To conclude, throughout the years we have found Mantoux testing surveys in our schools, with adequate follow-up, to be a very valuable tool in the control and eventual eradication of tuberculosis. The awarding of certificates to schools has helped us main-

tain a safe school environment. Our job is also to maintain a safe home and community environment. This we can only do by constant vigilance.

If we can stop infecting the oncoming generations, we will eventually eradicate tuberculosis. This is our goal and your job as well as ours.

* * * * *

**TB — 1956**

One third of the people in the United States today are infected with live tubercle bacilli.

This fact stands out in the face of the tremendous progress made against tuberculosis in recent years.

For the first time in history, progress against tuberculosis has overshadowed the tragedy of the disease. The death rate has been reduced drastically — 95 per cent since 1900, bringing it down to 10 per 100,000 population today. Yet —

Tuberculosis is still the giant among infectious-disease killers in this country, killing more than all other infectious diseases combined. It is killing 45 persons a day, causing one death every half hour.

Nearly 400,000 Americans are suffering from active tuberculosis today, 150,000 of these unreported to health authorities.

Approximately 100,000 new cases of tuberculosis are being reported annually, at a rate of one every five minutes.

* * * * *

**RECOMMENDED POLICIES AND PRACTICES FOR SCHOOL NURSING, REVISED EDITION. (JANUARY, 1957)**

If you will send us the name and address of nurses or others who are not members of the Association, we shall be glad to send them a copy of the above edition free of charge. If you prefer, on the receipt of the names and addresses, we can also send them in bulk direct to you.

Otherwise the publication may be purchased at fifty cents ($.50) per copy singly or in bulk.

*A. O. DeWeese, M.D.*

* * * * *

**PERSONAL**

*Norman Cousins*, editor of The Saturday Review and leader of educational movements to achieve better international understanding, has been named recipient of the 1956 Wayne Education Award.

Each year the University, upon recommendation of the College of Education faculty, grants the Award to a man or woman who has made recent and outstanding contributions to education.

# RECENT TUBERCULIN TESTING EXPERIENCES IN IOWA

PAUL C. WILLIAMSON

*Executive Director, Iowa Tuberculosis and Health Association*
*Des Moines, Iowa*

In December, 1954, the Iowa Sub-Committee on Tuberculosis of the American School Health Association was formed consisting of Abraham Gelperin, M.D., Des Moines, Chairman; Ralph E. Smiley, M.D., Mason City; R. B. Widmer, M.D., Winfield and Charles W. Gray, M.D., Iowa City.

The committee established the following requirements for certification and cleared them for approval of the Tuberculosis Committee of the American School Health Association:

*Class A Certificate*:

1. Ninety-five to 100 per cent of the children must be tested at least every three years with a tuberculin patch test or with a Montoux test of adequate dosage (1.0 milligrams of old tuberculin or 0.005 milligrams of purified protein derivative for those not reacting to smaller doses) with the following subsequent procedures:
   a. Children of grade school age who react to tuberculin need no other phase of the examination unless symptoms or history are considered of sufficient importance. An x-ray film of the tuberculin reactors is always valuable, and if facilities are available, this procedure is advisable. Otherwise the x-ray films of children below the age of 12 can be eliminated. However, their family physicians and the local health department should be notified in order that the source of their infection may be sought among their adult associates.
   b. All tuberculin reactors shall have x-ray film inspection of the chest during the freshman and senior years of high school, and whenever a shadow is found, complete medical examination shall be made to determine the etiology of the lesions causing it.
   c. All nonreactors to tuberculin from kindergarten through high school shall be retested at least every three years. Those who become reactors since the last testing shall be dealt with in the same manner as those who reacted to the first test.
2. All members of personnel of a school or system to be certified shall have the tuberculin test administered as for children. This includes teachers, engineers, cooks, bus drivers and all others employed by the schools.
   a. All nonreactors shall be retested every three years.
   b. All reactors on first or subsequent testing shall have x-ray film inspection of the chest. Whenever a shadow is found, the examination shall be completed to determine whether the lesion casting it is tuberculosis, and if so, whether it is of present clinical significance.
   c. All reactors, regardless of x-ray findings in the chest, shall be examined with reference to tuberculosis lesions in other parts of the body which might be discharging tubercle bacilli.
3. All students and members of personnel who are found to have progressive tuberculosis in any part of the body, that is in the contagious stage or threatening to become so in the near future, shall be removed

Presented at the American School Health Association Session — NTA Annual Meeting, May 21, 1956, New York City.

from school until adequate treatment has been administered and the danger of contagion is remote.

*Class B Certificate*:

Qualifications for a Class B Certificate are the same as for Class A, but when only 80 to 95 per cent of the children from kindergarten through high school are tested with tuberculin.

A packet of materials was developed with items included to explain the program, how it can be financed and conducted. The packet includes suggested educational materials such as pamphlets and posters. Included also are sample suggested forms to be used such as letter to parents and consent slip, notices to reactors, and non-reactors.

A prerequisite to certification is a required standardized statistical summary of the program to be provided on IBM key-punch cards which have been developed especially to provide information desired by the committee.

The sponsoring agency of the tuberculin testing program in schools shall include in its plans for the complete program the use of IBM key-punch cards, the cost of key-punching the cards and running analysis reports for the purpose of providing statistical information.

Because the Salk Vaccine program was started in the schools about the time we were ready to begin Tuberculin Testing for School Certification, we chose not to promote our program vigorously on a state-wide basis.

The quiet and modest approach, however, has been spreading to the extent that 332 schools have been certified during the past tuberculosis association fiscal year, showing a total of 32,991 students and adult personnel tested.

Statistical information available at this time covers 262 schools in 7 counties. Of an enrollment of 31,367, a total of 30,478 were tested revealing a percentage of 97.2 reached. There were 1,228 reactors amounting to 4.2 per cent. Reactors in the various schools ranged from 2.6 per cent to 11.1 per cent.

Within a few weeks a detailed statistical summary will be available with information by each school according to age, race, sex, reactors, non-reactors for both students and school personnel. The study will include also an analysis of follow-up.

Adequate follow-up is given great emphasis, from the early planning stages, to investigate all families of reactors.

Thus far a total of four new cases of tuberculosis have resulted from school certification efforts in Iowa.

One county program revealed a Father in one family and a Mother in another family. Both have been hospitalized. An uncle of one student is suspicious and under observation.

In a second county, a 17 year old male High School student had moderately advanced tuberculosis and has been hospitalized. This same program uncovered a 19 year old married male with moderately advanced tuberculosis, and he has been hospitalized. This young father had two small children—one of school age.

Another male adult from this program is being followed as a suspect.

The committee in its deliberations has developed a curiosity to investigate the possible relationship of human reactors to cattle herds.

Infected animals found at time of slaughter are being traced back to the farm of origin. Not only are other members of the herd being tuberculin tested, but the farm family is being tested too.

Conversely, if a number of reactors are found in a farm family as the result of the school certification program, inquiries are being made concerning the cattle herd.

Dr. Stanley Hendricks, Public Health Veterinarian of the Iowa State Department of Health, has exhibited interest in these approaches and is working cooperatively in these endeavors. The activity in this direction is so new in Iowa at this time, there is nothing to report as evidence.

Certainly, tuberculin reactors revealed in a farm family as the result of school certification tuberculin testing will enlist immediate concern on the part of the farmer as to the health of his herd.

It is interesting to note that Iowa has a law requiring all school bus drivers to show evidence annually that they do not have tuberculosis in a communicable stage. There is no law requiring other school personnel to do likewise.

School boards, however, may include such a requirement in the periodic physical examinations for teachers.

There is evidence that the school certification program is bringing this practice to the attention of Boards of Education and there appears to be a movement in the direction of freedom from tuberculosis.

This program, and the fact that 9 school teachers, 6 custodians, and 26 students were found to have tuberculosis in 1954 has created some concern among school administrators and some Boards of Education. (The 1954 figures are the latest available.)

For years our case-finding programs have demonstrated that known contacts have produced a high rate of new cases.

Contacts are those persons known to have been in close association with an active case of tuberculosis. Those persons are routinely tuberculin tested and examined and re-examined by x-ray and other clinical procedures in our programs. This method has been a sound and proven approach through the years.

All tuberculin reactors, however, have been contacts, whether they have been known prior to testing or not, and this group if examined and re-examined periodically will reveal new cases of tuberculosis efficiently and at a cost lower than any other mass method.

Miniature film screening experience in Iowa revealed these figures in 1953:

In county-wide fast tempo mass x-ray screening programs, it was necessary to x-ray 1,746 people to find one new case of tuberculosis. A total of 234,045 persons were x-rayed to find 134 new cases. The cost was $822.76 per case found.

In selective x-ray programs it was necessary to x-ray 907 persons to find one new case. A total of 13,609 were x-rayed and 15 new cases were found. The cost per case found from this approach was $237.35.

In contact case-finding programs, a total of 61 new cases were found by examining 2,306 persons at an average per case found of $189.27. One new case was discovered in every 38 contacts examined.

Most of the counties in Iowa conduct an annual contact case-finding program. It appears at this time that the reactors discovered in the school certification programs will be re-examined henceforth in the annual contact programs.

As Iowa conducts more county-wide mass tuberculin testing programs, it is planned to establish reactor registries because such a plan of re-examining these reactors periodically is economically and physically possible, and is more sensible than scattering our efforts among the total population.

With our present-day knowledge gained from long years of experience, it would seem our approach in the future must give greater attention to those in the population who are harboring tubercle bacilli in their bodies by evidence of their reaction to the tuberculin test.

If our purpose is to find tuberculosis, it stands to reason we should search for it where it is most likely to be found — by frequent re-examination of every tuberculin reactor.

In recent years tuberculosis morbidity and mortality reports have persistently indicated Iowa to be lower than the national average and generally near the bottom or at the bottom of the 48 states.

In 1952 an Epidemiologic Study Committee of the Iowa Trudeau Society was formed to concern itself with the existing tuberculosis situation in Iowa.

Among other avenues being investigated, the committee was curious to know what the tuberculosis infection rate might be among the general population.

Investigation revealed that some tuberculin testing had been done in various locations in the state, but the program varied widely from the standpoint of selectivity and techniques. Little emphasis had been placed upon the accumulation of data.

Attempts to gather information on past tuberculin testing efforts were soon abandoned.

The Epidemiologic Committee agreed that some form of tuberculin testing in Iowa would be desirable:

1. To find cases.
2. To measure infection.
3. To improve or intensify public interest in tuberculosis control.

The committee felt that uniformity of procedures in tuberculin testing would have to be established in order to evaluate the amount of tuberculous infection in Iowa humans.

The committee agreed upon two approaches:

1. School Certification patterned after the plan established by the American School Health Association.
2. Mass tuberculin testing on a county-wide basis.

The committee considered carefully the methods to be used and discussed the pros and cons of patch testing versus Mantoux testing and all agreed, of course, that use of the Mantoux test would be technically preferable.

However, the committee recognized that whatever procedure is used in Iowa, the program cannot be successful unless the following three elements are present:

1. Economy—the program must be within financial means.
2. A program that can be conducted with limited personnel and equipment.
3. A procedure acceptable to the public.

The decision to use patch testing or Mantoux testing is decided in all instances by the County Medical Society where the testing

is to be done. Medical Society approval is first obtained before a tuberculosis case-finding or testing program will be conducted anywhere in Iowa.

The first county-wide mass tuberculin testing program in Iowa was conducted in Jones County, because Jones County in the past, has exhibited more than usual interest in tuberculosis control.

The Epidemiologic Committee wanted to gather statistical data according to age, race, sex, marital status, occupation, and according to geographic area, such as urban and rural.

In addition, the committee was interested in studying the cost of mass tuberculin testing and its effectiveness as a case-finding device in comparison to miniature film screening programs.

The decision of the County Medical Society to use the Vollmer patch test was based on the belief it would be more acceptable to the public; that it would be more economical; and the testing could be accomplished with limited paid personnel with the aid of hundreds of volunteers.

At the same time, recognizing the limitations of the patch test, it was believed the survey would determine the infection trend in the community and in all likelihood, the patch test would not miss a case of tuberculosis in those tested.

A total of 12,392 persons were tested amounting to 63.8 percent of the 19,401 residents listed in the 1950 census. Of the population above five years of age, 69.1 percent were tested. There were 1,266 reactors amounting to 10.2 percent of those tested.

For both sexes, the highest percentage of reactors occurred in the age group, 60-64.

In females, the highest reactors reached 22.1 percent in the age group, 60-64.

In males, the peak of 30.1 percent reactors occurred in the age group, 55-59.

The mean age for all reactors was 42.1 years.

The mean age for male reactors was 41.6 years and for females, 42.8 years. Testing was first done in the city and county schools and the Anamosa Reformatory.

Later the county was organized to reach the adults and the organizational pattern followed utilized essentially the techniques developed in the USPHS Fast Tempo Miniature Film Screening Programs and outlined in the NTA Case-Finding Manual.

# A TUBERCULIN TESTING PROJECT IN HONOLULU

by

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*Territory of Hawaii*

and

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*Tuberculosis and Health Association of the Territory of Hawaii*

In October, 1955, an intensive long range tuberculin testing project was undertaken among the 24,000 school children in a well delineated section of the City of Honolulu. This project employs a full time staff of 5 people, including public health nurses and a statistical analyst. Although organized for a 5-year period, the records and procedures are all planned so that it may be continued for as long as may be considered feasible. The primary or overall objective is to determine how best to use the tuberculin test for the control, and we hope, the eventual eradication of tuberculosis in the Territory of Hawaii.

This paper will outline some of the events leading up to the initiation of this project, describe the project itself, and present some of the impressions gained from the experience so far.

Because of its geographical position, the Territory of Hawaii has always been acutely conscious of the importance of public health. Over 100 years ago, concern about the inroads of infectious disease into the islands led to the organization of a Board of Health by proclamation of the king. Between 1876 and 1930, the immigration of large numbers of persons from the Orient brought in to work in the growing plantation economy emphasized the economic importance of public health.

The Territory does have an enviable health record. Many of the ills that are prevalent in the South Pacific and the Orient do not or apparently cannot gain a foothold in the Islands. The mosquito host of the malarial parasite is non-existent. Hookworm and filariasis are apparently unable to survive in Hawaii although endemic in other Pacific Islands and the Orient. There is no rabies, for which quarantine has always been rigidly enforced. The tubercle bacillus however, has had no such difficulty. For 20 years after 1900, the death rate from tuberculosis remained high while that on the mainland was declining. It is not surprising therefore that tuberculosis was made a reportable disease as early as 1909,

when the Legislature mandated a bureau for tuberculosis control with responsibility for maintaining a case register and that sanatoria were built early in the fight against this disease. Until 1948 very few states had a higher tuberculosis death rate than did Hawaii. Now it is close to the bottom of the list of states in its mortality rate from tuberculosis. During the war years and for a couple of years after, the death rate from tuberculosis was over 55/100,000. In 1955 it had dropped to only a fraction over 6. Although the decline in the mortality is an almost universal experence, there are not too many areas where the rapidity of the decline during this past decade has been as pronounced or as rapid as it has in Hawaii.

As in the mainland United States, however, there has been no such rapid decline in the number of new cases reported. As a matter of fact, because of the decreasing case fatality rate, actually there are more on the roster of tuberculosis cases for which the health department must have the responsibility of assuring adequate treatment and follow-up than ever before. In 1955 the number of new cases reported was only 23% less than in 1950, whereas the number of tuberculosis deaths decreased by 71%. In the mortality and morbidity rate tables by states and terrtories as compiled by the U. S. Public Health Service in 1954, only Alaska, Puerto Rico, Arizona, District of Columbia, Kentucky, and New Mexico, have a higher rate of new cases than Hawaii. However, it should be remembered that a morbidity rate from tuberculosis is markedly influenced by (1) the extent of case-finding efforts; (2) the criteria used for diagnosis and reporting a case; (3) the diagnostic efforts applied to the suspicious case; and (4) the height of the threshold of suspicion on the part of the physicians, plus the cooperation of the private practitioner in reporting cases.

Hawaii in many ways is a unique community aside from the fact that it is 2,400 miles across the Pacific from the west coast of the United States. Its one-half million population is composed of many ethnic groups with a wide diversity of cultural backgrounds. Yet it should be pointed out that the people of Hawaii do not live in grass shacks. They go to the same type of schools, churches, offices, as do mainland residents. They work in factories, stores, and on farms, and shop at well stocked super-markets.

Except that there may be less migraton in an island community and within the limitation of the usual differences in American localities, tuberculosis control procedures may be practiced with

little variation in Hawaii or in any community in the United States with the expectation of comparable results.

In general, the tuberculosis control program in Hawaii has followed the same general pattern as in mainland United States. It has been built upon the four cornerstones of (1) case-finding; (2) providing facilities for the treatment and isolation of the active and infectious cases of tuberculosis; (3) long term follow-up of the person with inactive tuberculosis, and (4) health education.

The principle of aggressive tuberculosis case-finding was first widely applied through x-ray surveys, beginning in 1942, when mobile units and miniature films became available. The voluntary tuberculosis associations in the territory supplied a considerable part of the original survey equipment. Case-finding by this method is the spearhead of our tuberculosis control program today and will continue to be so for some time in the future.

There are three such mobile units for our one-half million population. Since 1944 complete island-wide surveys have been conducted at one to one and a half year intervals throughout the Territory. In the island counties of Maui and Kauai, approximately 80% of the population over 15 years of age are x-rayed with each visit of the unit. Since the first intensive x-ray survey of the metropolitan area of Honolulu in 1947 with a population of over 260,000, the x-ray units are scheduled routinely in areas throughout the city and seen continuously in the streets and lanes of Honolulu and the villages of rural Oahu. All of these surveys are a joint project of the health department and the tuberculosis associations. By public health regulations all food handlers, barbers, teachers, must have yearly x-rays. The high schools and the University of Hawaii are x-rayed yearly, and industries, large and small, as well as the plantations and residential areas have come to expect a yearly visit of one of the mobile units.

With almost 80% of the adult population of the more rural islands, and approximately 50% of the adult population in the City and County of Honolulu on Oahu, being x-rayed almost yearly for the past decade, it can be said that the Territory has been and is using this mass x-ray approach rather extensively. These x-ray surveys have resulted in the discovery of almost one-half of the new cases reported each year. Even though the response of the people in more recent years to x-ray surveys is as great if not greater than before, the yield of new tuberculosis cases has tapered to less than two per thousand films and is tending to fall lower than findings of non-tuberculous chest pathology. Even in the ad-

mission x-ray programs of the three general hospitals in Honolulu, the yield of new cases is less by mobile unit survey with the discovery of not quite one new case for every 2,000 x-rays, but those of us who know tuberculous infection can readily justify to our own satisfaction the long continued use of a tool which finds *any* tuberculosis not previously known. On the other hand, we are keenly interested in any other tool which may supplement our present yield in case-finding, or in any method to make surveys more selective.

Some of our reasons for studying a new approach included the more than occasional discovery of advanced tuberculosis in persons who had never been x-rayed, the indifference of a substantial part of our population toward x-ray opportunity, the circulation of propaganda to the effect that tuberculosis is about finished as a public health problem, and a question from some of our private practitioners, especially the pediatricians, on what might be done about tuberculous infection in children. It appeared as if the tuberculin test provided a potential for tuberculosis control not heretofore fully utilized in our community.

Could we find some sources of infection not identified by present case-finding methods? By a follow-up of the positive reactors, will we be able to prevent, or discover clinical disease earlier? Could we provide objective illustration of the prevalence of tuberculous infection and of its threat to apparently healthy families? Could we identify persons or the groups of people who might become clinical cases in the future by prolonged observation? Since the positive tuberculin test indicates infection, could prophylactic treatment of at least the recent convertors prevent clinical disease in the future? Could we build up a further extension of public interest in case-finding and tuberculosis control? Could we find out the obstacles and pitfalls, the economical and effective methods and ultimate costs and results obtainable before supporting or rejecting this tool as a major element in future case-finding?

Tuberculin testing was introduced in our communities as it was in many places elsewhere on a group scale in the 1930's. The percentage of positive reactors in each group tested, whether in schools, industry or local communities ran too high to make intensive follow-up, either of the positive reactors or for the source of the infection, a feasible undertaking at that time. These early projects served, however, to set a bench mark with which to make rough comparisons in later years and helped to alert our public concerning the prevalence of tuberculous infection in the community.

Since 1945 yearly tuberculin tests have been administered to the 7th grade students of our city schools. Several years of this 7th grade program produced certain dividends. We had from this, some indication of the general rate of decline of tuberculous infection in the community. By this means, also, school personnel, school children, public health nurses and some parts of the general public had some introduction to this case-finding tool which helped to accelerate their ready acceptance of its more extensive use in a new project.

A long sequence of special meetings and conferences preceded more specific planning for this project. One of them brought together the perspectives of our tuberculosis clinicians and a number of our pediatricians. Another committee of doctors, nurses, and laymen, concerned with the health of school children, performed some spade work concerning ways and means and made recommendations which were accepted by the School Commission. The county tuberculosis association was active in the planning, prepared and circulated prospectus materials as the project took shape, and gave it further publicity through a panel discussion at its annual meeting. While this voluntary agency accepted virtually the entire fiscal responsibility, the project was planned jointly by the agencies which would be involved and each of them knew and agreed to what lay ahead. Preliminary planning was discussed with a special committee of the Honolulu County Medical Society, and when plans had reached definite shape they were presented to the Board of Governors of the Medical Society and approved at a membership meeting.

In the planning, it was considered necessary to employ a well-qualified, full-time team, not only because the project we had in mind could not have been done by the existing health department personnel, but also to assure uniformity. All of the interested agencies agreed on the application of predetermined techniques, as nearly uniform as they could be made, so that we shall be able to reach our conclusions from entirely homogeneous data. Much thought was given to the statistical reporting and to the type of records which will yield such statistics. Our statistical analyst was one of the first persons to go on the payroll, after the supervisor, and has had an active part in each step of record design and entry.

The planning committee selected for this pilot study a definite area of the City of Honolulu, listing the schools in which testing was to be undertaken. The area selected for the pilot study is one

in which the prevalence of tuberculosis is relatively high. The immediate benefit that should accrue by a concentrated attack on this one area is not the only objective. The results so far are promising. It is one of the areas where response to x-ray surveys tends to lag. While it includes some of our more crowded housing, the population includes few transients. All of our racial elements are present in substantial numbers. The school enrollment is approximately one quarter of all the school children in Honolulu.

What takes place in a given school whose children are to be tested? While the whole community has been made aware of the project through newspaper publicity and radio comment — in four languages: English, Chinese, Japanese, and the Ilocano dialect of the Filipino language — and while the testing program is scheduled definitely up to the end of the school year, further special meetings take place at each school. The teachers and leaders in the Parent-Teacher groups get a first-hand story from health educators and nurses and have an opportunity to ask the questions which concern them.

Then the project clerk makes out cards — which we call "A" cards — for each child enrolled in a school. A form letter signed by the school principal with a brief description of the meaning of the test goes to each parent. Included in the letter is a coupon for parents' consent for the tuberculin test and asking for the name of the family physician. These form letters are taken home by the children with appropriate circular material. The teachers assist in obtaining either consent or refusal from each family.

When the test day arrives, the children who have brought in consent slips are assembled, a class at a time, and given a Mantoux test which is entered on our "A" record cards. In our testing sessions, the public health nurses of the team administer the tuberculin, while an aide loads and refills the syringes. The test area of the arm is sponged by volunteers, either older children or mothers from the Parent-Teachers Association groups. We adhere strictly to the technique described in the U. S. Public Health Service Manual on Tuberculin Testing using platinum tipped needles flamed after each use. Dosage is determined by watching the calibration on the syringe, not the weal under the epidermis. The solution used is commercially obtainable PPD in a freshly prepared dilution of .0002 mg per dose.

This full-time, permanent team can test a thousand children in a day without haste or excessive interruption of school routines.

They are less interested in speed records, however, than in answering the questions many children ask and in reassuring those who are frightened by the procedure.

The same team returns to the school to read reactions, not sooner than two days nor later than four days after test administration. Recording is done by another member of the team while a school representative identified each child, so that the right reading is entered on the right card. Palpable induration of 6 mm or more is used as the criterion for recording a reaction as positive. On the other hand, while classifying them as negative, we also record indurations of less extent than 6 mm. In this way we know the precise story of each year's reaction in each child.

Subsequent procedure regarding each positive reaction involves a program relating to the reactor, himself, the search for the source of his infection, and the initiation of a suitable live record. The doctor who has been named as family physician on the consent slips is notified if the result is positive. This notification has given the private physician a better view of the program and a number of them have helped to make it more effective. Clearances are also made with the tuberculosis case register, the Department of Health chest clinic records and the active lists of the public health nursing bureau, thus eliminating duplication of services.

The public health nurses of the project visit the homes of the positive reactors, explain the results of the test to the parents, emphasize that the source of the child's positive reaction should be searched for, and refer the child and the family to their private physician or to the tuberculosis bureau.

It is planned to x-ray each positive reactor over 12 years of age at least yearly until they leave school. Reactors under 12 will receive only the initial x-ray but will be x-rayed at least yearly when they become 12.

As you have anticipated, the major drama of this study, thus far, is the search for sources of tuberculosis infection in the environments of positive reactors. While many of the positive reactors are in families already known by the tuberculosis bureau, additional new cases were added to the tuberculosis case register after five months of field work on the project. The number is not sensational, but each new case was a probable source of infection in his environment, which, in each case, included children.

In addition to the initial tuberculin testing card (or "A" card), a "B" card or follow-up card is made out for each positive reactor. This goes into a central alphabetical file, constituting the nucleus for a positive tuberculin register and providing a tickler system for further steps in follow-up, and a cross-reference to the tuberculosis case register. This procedure leaves the "A" card for the positive reactor back in the original alphabetical file for use the following year, since he will be tested again along with those who were negative. Both sets of cards are coded for subsequent IBM analysis, but are also designed so that progress reports may be obtained easily and simply.

We expect to re-test positive reactors as well as negative reactors each year, unless contraindicated by violent individual reaction. By this procedure, we hope to disclose false positives, if present, and reversions, if any, from positive to negative, and to become more familiar with the vagaries of the test.

Among the reasons given earlier for embarking on the program, the most obvious objective is in relation to case-finding. We should like to be able to determine more clearly what should be considered a "case." Have we found a new case only when as formerly we have identified the obvious results of necrosis? Where, in the cycle of progression from infection, as evidenced only by a positive reaction to tuberculin, to the obvious development of disease, can detection be attempted on a large scale? We know that we will not find the source of the infection in many of the children with a positive tuberculin reaction, even though very young or recent convertors. We do not know whether, with a higher index of suspicion applied to the possible sources and by utilizing the present admittedly crude methods of diagnosis more fully, we would find more.

We would like to know what records and what logistics are necessary to follow-up hundreds of positive reactors, and to find out how many positive reactors in our population progress sooner or later to clinical tuberculosis. Clinicians and practitioners in the Territory need information on which to determine whether or not to utilize the antimicrobials on positive reactors, especially on young children or recent convertors. We would like to have a more accurate picture of the trend of the disease in the Territory, and to seek new criteria with which to measure or estimate the effectiveness of our past and current efforts further to reduce tuberculosis.

Since the tuberculin testing project has been in operation for only six months it is not possible to present any definite results. However, a few of the obvious preliminary data can be mentioned. By April 15, 1956, a total of 18,000 (17,944) children from kindergarten through high school had been tested with a prevalence of positive reactors in the entire group of 7.2%. The prevalence in the kindergarten group was 2.3% with a gradual increase through the 9th grade. Between the 9th grade (intermediate schools) and the 10th grade (high school) the percentage of positive reactors jumped precipitously from 10.4% to 18.7% with a leveling off through the high school grades. This precipitous change between the 9th and 10th grades remains unexplained.

A tuberculin testing survey was done in 1931 in the intermediate schools of the same district finding up to 74% positive reactors. Ten years ago the prevalence of positive reactors in the 7th grades in Honolulu, which have been tested annually for many years, was 18%. In 1956 this had dropped to 8%.

As of April 15, 1956, follow-up on 90% of the 335 positive reactors in four intermediate schools comprising 4000 children, had been completed with results of their examinations known. 320 families were represented and a total of 1,253 adult (over 15) associates of the children with positive reaction were named by the public health nurses of the project calling in the homes. This is 3.9 persons for each family with a positive reactor. Of these, 69% of the associates within the household and 40% of those outside had been examined. Another 308 pre-school siblings of the reactors were Mantouxed and x-rayed if positive. Out of the entire group, 3 adults with active, previously unrecognized advanced tuberculosis, one child of 3 years with active primary tuberculosis, and one 10th grade school girl with active minimal disease were found and hospitalized. Several other adults are undergoing studies to determine the significance of lesions seen on x-ray and several children known to have had negative reactions within the preceding year or two are being carefully watched. In 17% of the families in which children with positive reactions were found, the probable source of the infection was already known to the tuberculosis bureau records.

Certainly the results at this early stage cannot be called spectacular but with each new reactor the "who dun it" spirit runs high and new vistas continually stimulate the enthusiasm of all involved. There is considerable satisfaction over even the relatively few active cases found.

The emphatic approach to the search for all possible sources of the infection of the positive reactors, especially in the children in the elementary grades, together with an energetic and careful clinical evaluation of those adults whose chest x-rays show an abnormal pulmonary shadow is already beginning to show evidence that this project will prove its worth as a "one shot" case-finding measure alone. We must wait for time to tell to what proportions we can go with such a plan and how much we can accomplish.

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## PERSONALS

### WE ADD OUR TRIBUTE

*Dr. I. P. Barrett,* graduate of the University of Texas Medical School, Galveston, Texas, 1924, and Director of Health for the Fort Worth Public Schools since 1939. Dr. Barrett was chosen for his outstanding contributions in the field of School Health. At the last annual meeting of the Texas Public Health Association, Dr. Barrett was honored as the first recipient of the B. T. Bryant Public Health Memorial Award. The purpose of the award is to recognize some one person annually for his outstanding contributions in the field of Public Health. Dr. Barrett has just completed a most successful year as President of the American School Health Association.

*Dr. Charles H. Keene,* graduate of Harvard Medical School in 1902, has recently been recognized by the University of Buffalo in the News-letter for Physical Education Majors, November, 1956. In addition to his long list of accomplishments and awards in the field of medicine, education, and military service (Who's Who in Medicine) we are told of his prowess as an athlete and sportsman, of his distinguished and devoted family and of his many friends who speak of him as "the congenial gentleman with the twinkle in his eye and a sly grin upon his lips, who after serving thirty-one years on the Faculty of the University of Buffalo, can still manage to find a humorous side to every question. A man who has given us the benefit of his experience and knowledge up and beyond the call to duty." We know him best as a good friend and longtime Editor of the *Journal of School Health.*

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### CHOSEN AS MEDICAL WOMEN OF THE YEAR—

*Philadelphia Area—Dr. Ruth Hartley Weaver,* graduate of Woman's Medical College of Philadelphia in 1917, and MPH from the University of Pennsylvania. Dr. Weaver is Director of the

Division of Medical Services for the Philadelphia Board of Public Education, and was cited for her "untiring efforts in making modern advances in health programs and education in the public schools." She is known to us as one of the planners of a very successful program of the American School Health Association meeting in Atlantic City this year, and as author of articles in the field of medicine, and most recently as President-Elect of the American School Health Association.

*Chicago Area—Dr. Vida A. Latham, D.D.S.,* from the University of Michigan in 1892, and M.D. in 1895. Dr. Latham has held professorships in histology and pathology, as well as in oral surgery, and is a fellow of "countless professional societies here and abroad and the author of many scientific treatises" in a variety of fields. Dr. Latham was a pioneer among women in the fields of medicine and of dentistry. At the age of ninety, she still practices in both fields, and still makes night calls when her patients need her. She is an accomplished musician at the organ and piano, and has compositions in music to her credit in addition to those in the biological sciences. What does she know about diatoms? She is an authority! But best of all, she has been a warm friend to young women about to enter the field of medicine.

* * * * *

## AN INVITATION TO BECOME AN INDIVIDUAL ASSOCIATE MEMBER OF THE INTERNATIONAL UNION FOR HEALTH EDUCATION OF THE PUBLIC

The International Union for Health Education of the Public, which came into being in 1951, is a non-governmental organization whose aims are to promote continuing improvement in health education of the public around the world. It is fundamentally important that non-governmental agencies be associated in this important work, for the ability of peoples everywhere to understand and meet the threats of illness and to maintain health is largely dependent upon health knowledge and voluntary effort.

But it is not enough that voluntary health agencies be associated, for in the last analysis it is the *individual* who is actually responsible for promoting health education. It is particularly important, therefore, that professional workers concerned with health education affiliate themselves as individual members of The International Union.

For an application for membership, send to: International Union for Health Education of the Public, c/o Bureau of Public Health, Equitable Life Assurance Society, Room 711, 393 Seventh Avenue, New York 1, New York.

## REVIEW

"Round Table on State Health Councils," new publication of the National Health Council, mirrors the facts and opinions brought to a consultation among 22 officers and executives of 18 state health councils in New York City, March 19 and 20, 1956.

"The national picture reflected in the report is highly varied but made up of guidelines from experience that any leader in cooperative action for health improvement should find highly useful," said Philip E. Ryan, executive director of the National Health Council, which sponsored this first national meeting of state council leaders with aid of a grant from the Milbank Memorial Fund.

The booklet was written by Yolande Lyon who authored "Stepping Stones to a Health Council," little "bible" for those forming and conducting community health councils since its first edition appeared in 1947.

A section that health action leaders will find particularly useful is that briefing "Specific Accomplishments" in ten different states. A sampling of these:

—promoting certification of school nurses and recruitment of health personnel through school guidance directors
—helping to establish 50 rural medical, six rural dental, and 74 nursing scholarships
—holding statewide conferences on such subjects as handicapped children and hospitalization for the indigent
—surveying facilities for rehabilitation in a tuberculosis sanitarium and recommending improvements
—working for legislation to establish local health departments, school health examinations, and medical technician training
—sponsoring five regional health conferences covering 133 counties, attended by approximately 1,000 persons
—sponsoring a statewide survey of sickness
—issuing a directory of services available to handicapped children and recommending improvements in their education and rehabilitation

The booklet reflects a viewpoint by saying that growth "in the movement toward organizing state health councils paralleled the growing philosophy that single agencies alone cannot do the job of maintaining health progress. Doctors alone cannot do it. Official health departments alone cannot. Neither can voluntary health organizations, alone. This philosophy also implied that the public must be increasingly involved in movements to improve community health. The value of the state health council, as of the local health council, was felt to be the potential ability of its members to act in unison and to go to the people as a broadly representative group of health forces in the community."

The 36-page offset booklet is available for 50c from the National Health Council, New York 19, N.Y.

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## LESTER TAYOR MEMORIAL SCHOLARSHIP SECOND YEAR

A $500 scholarship, named for the Cleveland Health Museum's first president, has been made available by the Women's Committee of the Museum to any qualified graduate student interested in:

1. school health education
2. visual methods in health education
3. educational work in museums

Special projects, tailored to the interests and requirements of the candidate, are set up for completion in from one to three months.

All projects must be completed on the Museum premises under the direction and supervision of its professional staff, and a written report of the project(s) is required.

A tuition fee of $100 will be paid to the Museum from the $500 stipend. The remainder is paid directly to the candidate for living and other expenses.

Address all requests for applications to Bruno Gebhard, M.D., Director, Cleveland Health Museum, 8911 Euclid, Cleveland 6, Ohio.